RAYTHEON

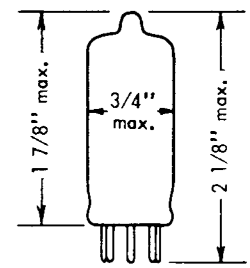
TECHNICAL INFORMATION

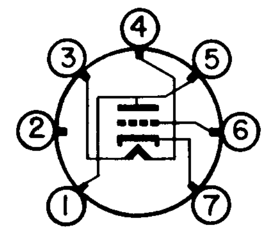
Excellence in Electronics

RELIABLE TRIODE

TYPE CK6100/6C4WA

The CK6100/6C4WA is a heater-cathode type medium-mu triode of miniature construction, suitable for use as a class c amplifier and oscillator. This type is characterized by long life and stable performance. It is designed for service where conditions of high temperature and mechanical shock or vibration are encountered.





BOTTOM VIEW

6BG

MECHANICAL DATA

ENVELOPE: T-5½ Glass

BASE: Miniature Button Base 7-Pin

TERMINAL CONNECTIONS:

- Pin 1 Plate
- Pin 2 Internal connection
- Pin 3 Heater
- Pin 4 Heater
- Pin 5 Plate
- Pin 6 Grid
- Pin 7 Cathode

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test---Note 3)	450 G
Maximum Vibrational Acceleration (100 Hour Fatigue Test---Note 4)	2.5 G
Maximum Bulb Temperature	165 °C

MOUNTING POSITION: Any

ELECTRICAL DATA

CAUTION-----To Electronic Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if absolute maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are directly related to the degree that regulation of the heater voltage is maintained at its center rated value.

RATINGS AND NORMAL OPERATION:	MIL-E-1B SYMBOL	ABSOLUTE MINIMUM	NORMAL TEST CONDITIONS (Note 6)	NORMAL OPERATION (Note 5)		ABSOLUTE MAXIMUM	MIL-E-1B UNITS
Heater Voltage (Note 7)	Ef:	5.7	6.3	6.3	6.3	6.9	V
Plate Voltage	Eb:	----	250	100	250	330	Vdc
Grid #1 Voltage	Ec1:	----	-8.5	0	-8.5	----	Vdc
Plate Dissipation	Pp:	----	----	1.2	2.6	3.8	W
Grid #1 Circuit Resistance	Rg1:	----	----	----	----	1.2	Meg.
Grid Current	Ic:	----	----	----	----	5.5	mAdc
Heater-Cathode Voltage	Ehk:	-200	----	----	----	+200	Vdc
Plate Current (Note 9)	Ib:	----	----	11.8	10.5	20	mAdc

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)

TEST	CONDITIONS	AQL %	MIL-E-1B SYMBOL	MIN.	LAL	BOGIE	UAL	MAX.	ALD	MIL-E-1B UNITS
ACCEPTANCE TESTS - GROUP C										
Continuity and Shorts (Inoperatives):		0.4								
ACCEPTANCE TESTS - GROUP D		**Combined AQL = 1.0 %**								
Heater Current:		0.65	If:	138	----	150	----	162	----	mA
Heater-Cathode Leakage:	Ehk=+100 Vdc	0.65	Ihk:	----	----	----	----	10	----	μAdc
	Ehk= -100 Vdc		Ihk:	----	----	----	----	10	----	μAdc

ELECTRICAL DATA (cont'd)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)(cont'd)

TEST	CONDITIONS	AQL %	MIL-E-1B SYMBOL	MIN.	LAL	BOGIE	UAL	MAX.	ALD	MIL-E-1B UNITS
ACCEPTANCE TESTS - GROUP D (cont't)										
Grid Current:	Rg=0.1 meg.	0.65	Ic (1):	----	----	----	----	-0.5	----	μAdc
Plate Current (1):		0.65	Ib (1):	6.5	9.0	10.5	12.0	14.5	3.5	mAdc
Transconductance (1):		0.65	Sm (1):	1750	2000	2200	2400	2650	450	μmhos
ACCEPTANCE TESTS - GROUP E										
Insulation of Electrodes:	Ef=6.3 V									
	Eg-all=-100 Vdc	2.5	Rg1-all:	100	----	----	----	----	----	Meg.
	Ep-all=-300 Vdc		Rp-all:	100	----	----	----	----	----	Meg.
Plate Current (2):	Ec1=-25 Vdc	2.5	Ib (2):	----	----	----	----	20	----	μAdc
Plate Current (3):	Ec1=-18 Vdc	2.5	Ib (3):	5	----	----	----	----	----	μAdc
Transconductance (2):	Ef=5.7 V	2.5	Δ_{Ef}Sm(2):	----	----	----	----	15	----	%
Transconductance (3):	Ec1=0; Eb=100 Vdc:	2.5	Sm (3):	2500	2900	3250	3600	4000	800	μmhos
Grid Current (2):	Eb=250 Vdc; Rg=0.5 Rk=470 ohms; Ec1=0; After 5 minutes at Ef=7.0V measure grid current at Ef=7.0V; 3 minutes test not permitted.	2.5	Ic (2):	----	----	----	----	-1.0	----	μAdc
RF Noise:	Ecal=15 mVac	2.5	-----	----	----	----	----	3.0	----	mW
Noise and Microphonics:	Eb=250 Vdc; Ec1=-8.5 Vdc; Rk=0; Rp=10,000; Ef=6.3 Vac: Ehk=0	2.5	Ep:	----	----	----	----	25	----	mVac
ACCEPTANCE TESTS - GROUP F										
Vibration (2):	Rp=2000 ohms; Rg=0.1 meg.	6.5	Ep:	----	----	----	----	50	----	mVac
Amplification Factor:		6.5	Mu:	15.5	16.2	17.0	17.8	18.5	1.8	
Capacitance:			Cgp:	1.2	----	1.6	----	2.0	----	μμf
Capacitance:	Note 2	6.5	Cin:	1.35	----	1.8	----	2.25	----	μμf
Capacitance:			Cout:	0.98	----	1.3	----	1.62	----	μμf
Low Pressure Voltage Breakdown:	Pressure=55±5 mm Hg: Voltage=500 Vac	6.5	----	----	----	----	----	----	----	----
ACCEPTANCE TESTS - GROUP A										
Shock:	Ehk=100 Vdc; Rg=0.1 Meg.; Hammer Angle=30°; Note 3	20	-----	----	----	----	----	----	----	----
Fatigue:	96 hours; G=2.5; Fixed frequency; F=25 min. 60 max. (Note 4)	6.5	-----	----	----	----	----	----	----	----
Post Shock and Fatigue Test End Points:										
Vibration (2):	F=25 Cps; G=2.5; Rp=2000 ohms	----	Ep:	----	----	----	----	100	----	mVac
Heater-Cathode	Ehk=+100 Vdc	----	Ihk:	----	----	----	----	15	----	μAdc
Leakage:	Ehk=-100 Vdc	----	Ihk:	----	----	----	----	15	----	μAdc
Transconductance (1):		----	Sm (1):	1500	----	----	----	2650	----	μmhos
Grid Current (1):		----	Ic (1):	----	----	----	----	-1.0	----	μAdc
ACCEPTANCE TESTS - GROUP B										
Glass Strain (Thermal Shock):		2.5	----	----	----	----	----	----	----	-----

TEST	CONDITIONS	AQL %	MIL-E-1B SYMBOL	MIN.	MAX.	MIL-E-1B UNITS	Maximum Defects per Characteristic: 1st Sample	Maximum Defects per Characteristic: Combined Sample
ACCEPTANCE LIFE TEST								
Heater Cycling:	Ef=7.5 V; Ehk=+135 Vdc; Eb=Ec=0; 1 min. on, 1 min. off	----	-----	2000	----	Cycles		
Heater Cycling Life Test End Points:		----	-----	----	----	-----		
Heater-Cathode	Heater Positive	----	Ihk:	----	20	μAdc		
Leakage:	Heater Negative	----	Ihk:	----	20	μAdc		

ELECTRICAL DATA (cont'd)

TEST	CONDITIONS	AQL %	MIL-E-1B SYMBOL	MIN.	MAX.	MIL-E-1B UNITS	Maximum Defects per Characteristic 1st Sample	Combined Samples
ACCEPTANCE LIFE TEST (cont'd)								
1 Hour Stability Life Test:	TA=room; Ehk=+135 Vdc. Rg=0.5 Meg; Rk=470 ohms Ec1=0.	----	-----	----	----	----		
1 Hour Stability Life Test End Points: Transconductance (1) change of individual tubes from initial:	(Typical Sample Size=50 tubes)	1.0	ΔSm (1):	----	10	%		
100 Hour Survival Rate Life Test:	TA=room: Ehk=+135 Vdc: Rg1=0.5 Meg; Rk=470 ohms; Ec1=0.	----	-----	----	----	----		
100 Hour Survival Rate Life Test End Points: In operatives:	(Typical Sample Size=200 Tubes)L	0.65	-----	----	----	----		
500 and 1000 Hour Intermittent High Temperature Life Test:	T Bulb=165°C; Ehk=+135 Vdc; Rk=470 ohms; Ec1=0; Rg1=0.5 Meg.							
500 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Size=20 tubes 1st sample, 40 tubes 2nd sample, Total Allowable combined defects=4 tubes 1st sample, 8 tubes 1st and 2nd samples).	----	-----	----	----	----		
Inoperatives		----	-----	----	----	----	1	3
Heater Current		----	If:	138	162	mA	1	3
Heater-Cathode Leakage		----	Ihk:	----	10	μAdc	1	3
Grid Current (1)		----	Ic (1):	0	-0.5	μAdc	1	3
Transconductance (1)		----	Sm (1):	1600	2650	μmhos	1	3
Transconductance (1) Average change (Note 10)		----	Ave. ΔSm (1):	----	15	%		
Electrode Insulation (g-all)		----	Rg-all:	50	----	Meg.	2	5
(p-all)		----	Rp-all:	50	----	Meg.		
Transconductance (2) (Note 8)		----	ΔSm (2):	----	15	%	2	5
1000 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Size=20 tubes 1st sample, 40 tubes 2nd sample)	----	-----	----	----	----		
Inoperatives:		----	-----	----	----	----	2	5
Heater Current		----	If:	138	162	mA	2	5
Heater-Cathode Leakage		----	Ihk:	----	10	μAdc	2	5
Grid Current (1)		----	Ic (1):	0	-0.5	μAdc	2	5
Transconductance (1)		----	Sm(1):	1500	2650	μmhos	2	5

NOTES:

Note 1: Characteristics, Quality Control Test Procedures, and Inspection Levels are made according to the appropriate paragraphs of MIL-E-1B, "Inspection Instructions for Electron Tubes," and MIL-STD-105A.

Note 2: Without Shield.

Note 3: Test Conditions and Acceptance Criteria per Shock Test procedures of MIL-E-1B basic specifications.

Note 4: Test Conditions and Acceptance Criteria per Fatigue Test procedures of MIL-E-1B basic specifications.

Note 5: These normal values represent conditions at which control of reliability may be expected.

Note 6: These normal test conditions are used for all characteristics unless otherwise stated under the individual test item.

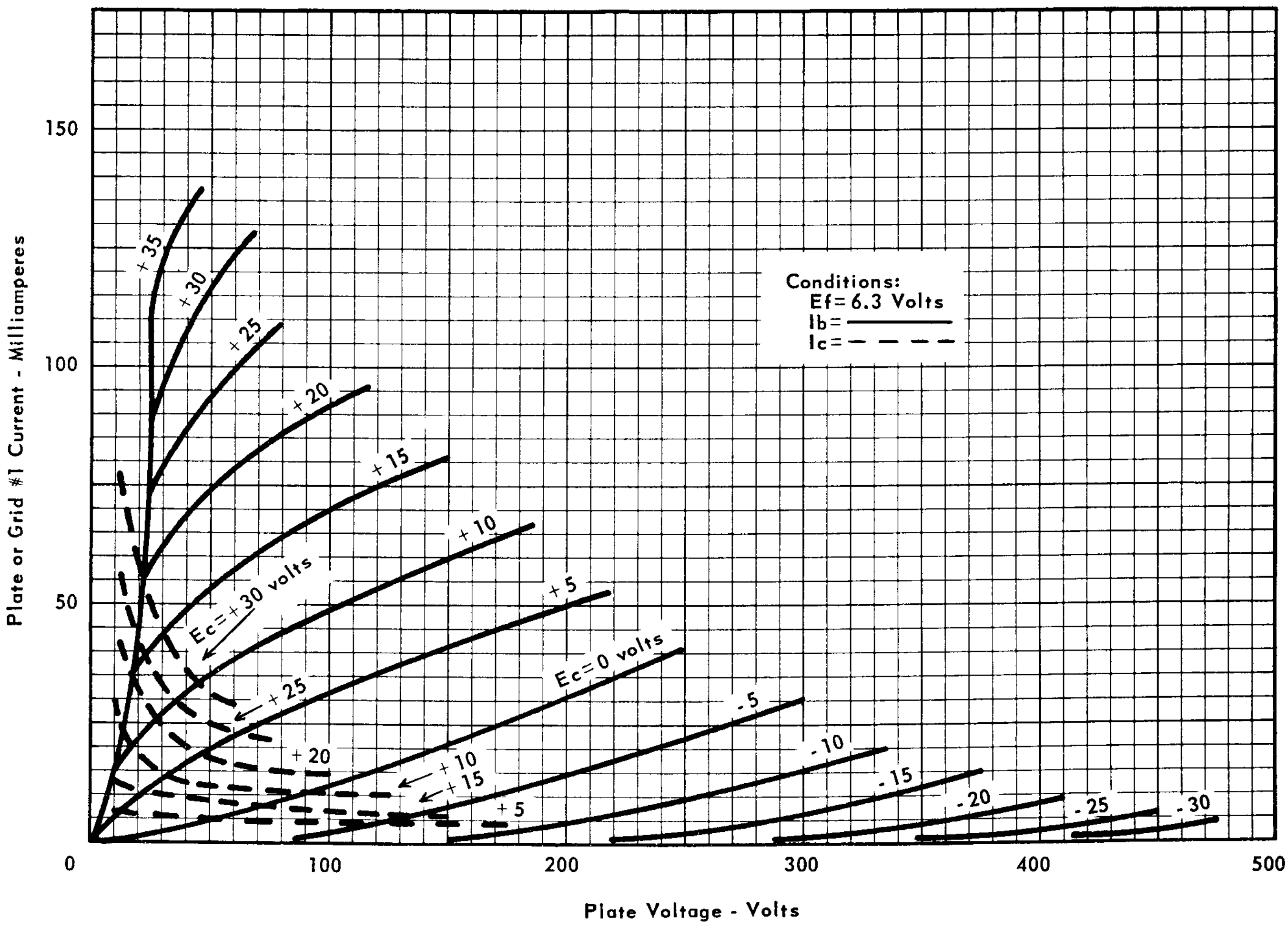
Note 7: For most applications the performance will not be adversely affected by ±10% heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.

Note 8: Change of transconductance for individual tubes from that value measured at Ef=6.3 V to that value measured at Ef=5.7 V.

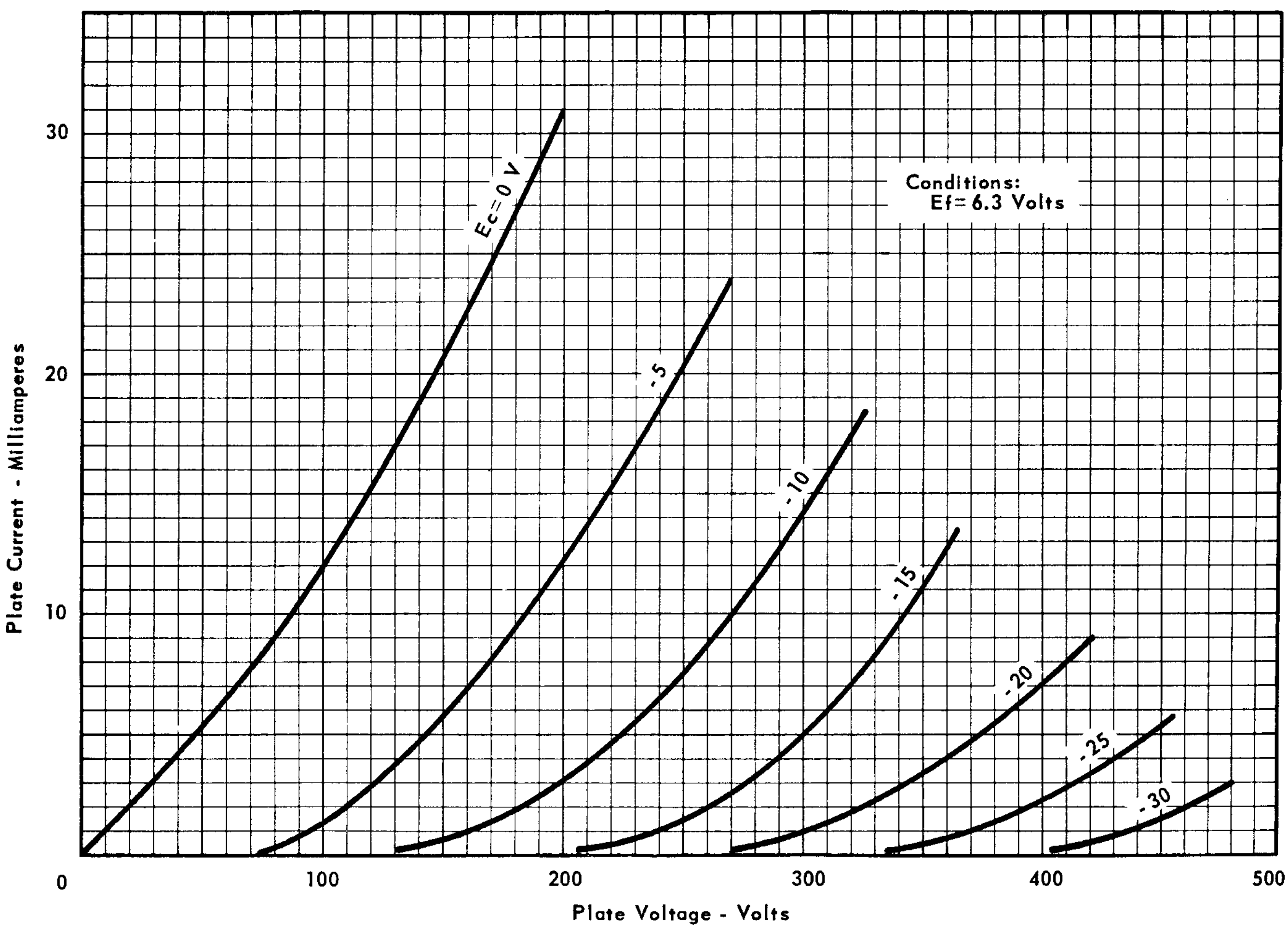
Note 9: Difficulty may be encountered if this tube is operated for long periods of time with very small values of cathode current.

Note 10: The average percentage change shall be ascertained from the determination of the individual changes for each tube (inoperatives excluded) from the zero hour valve for the referenced characteristic.

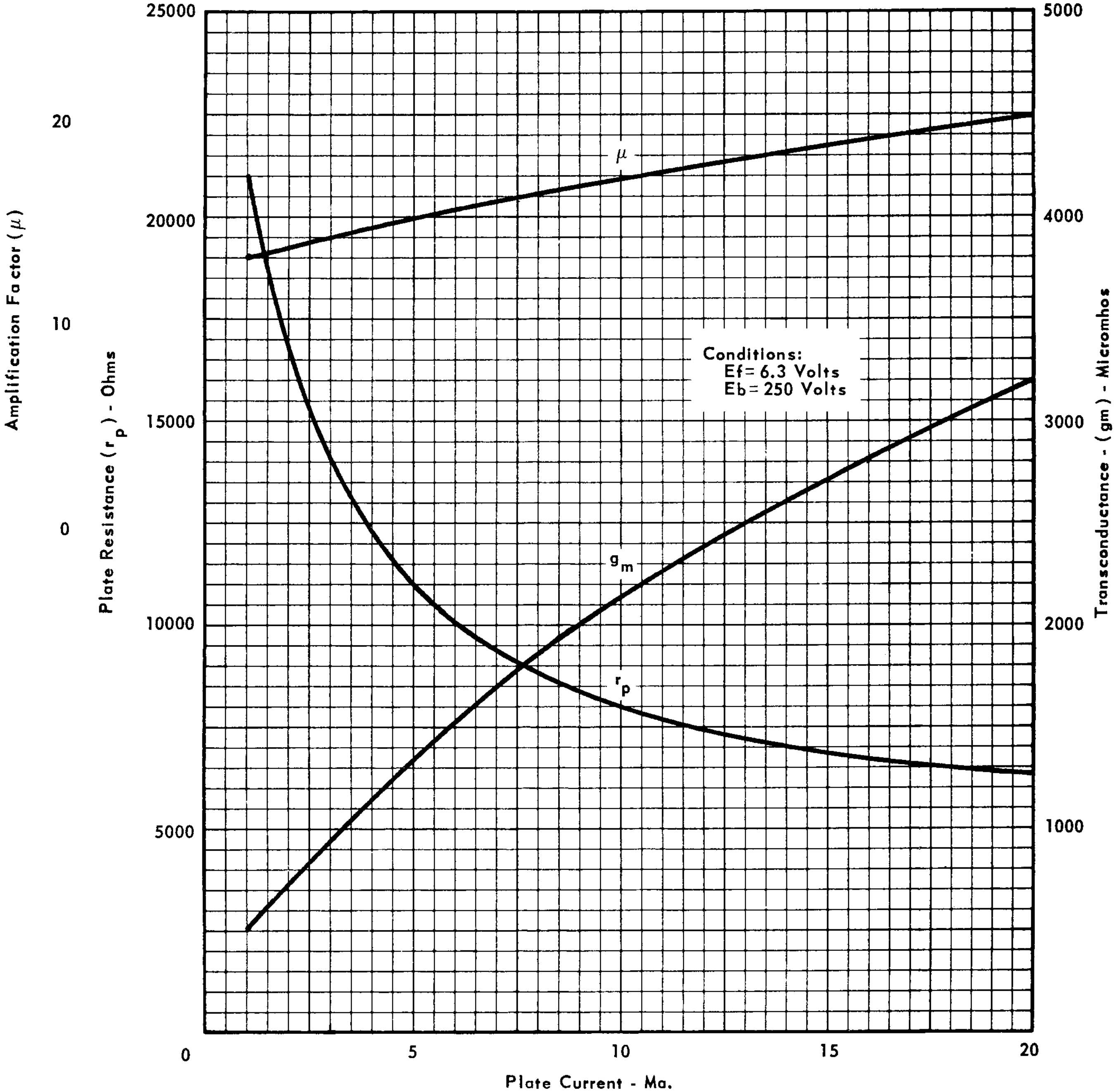
AVERAGE PLATE CHARACTERISTICS



AVERAGE PLATE CHARACTERISTICS



AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS

